



NC DEPARTMENT OF  
**HEALTH AND  
HUMAN SERVICES**

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**SUSAN KANSAGRA** • Assistant Secretary for Public Health

Division of Public Health

**MEMORANDUM**

**DATE:** July 13, 2023

**TO:** Environmental Health Directors, Supervisors, Coordinators, Specialists, and the Regulated Community

**FROM:** On-Site Water Protection Branch

**RE:** Permitting and Design Guidance for Wastewater Treatment and Dispersal Systems for Recreational Vehicle Parks – UPDATED (from June 2023)

**I. Background**

A Recreational Vehicle (RV) is a vehicle that combines transportation and temporary living quarters for travel, recreation and camping. Wastewater stored in RV holding tanks is quite concentrated due to the ultra-low flow fixtures and the widespread use of commercial chemical additives for odor control. This can cause the wastewater from an RV to also be classified as “high strength”. Depending upon the circumstances, an RV Park’s on-site wastewater system (system) may require design by a North Carolina licensed professional engineer (PE) and may also require approval by the State prior to permitting by the Local Health Department (LHD). Wastewater stored and transported in RV holding tanks is also defined as domestic septage under the State’s solid waste laws, subject to removal and disposal requirements regulated by the Division of Waste Management [G.S. 130A-290(a)(1c), and G.S. 130A-290(a)(32)]. (See Section III.E, Dump Stations, in this guidance document)

This guidance document outlines design considerations, permitting procedures, and management methods for RV Parks consistent with applicable Statutes and Rules. Consistent with National Fire Protection Association Standards (NFPA), an RV Park addressed by this guidance includes two or more RVs located on an individual lot or tract of land or multiple RVs, each located on adjoining lots under common ownership or control. The RV Park is served by a common system sized in accordance with this document and not as a dwelling unit or each RV may be served by an individual system located on common property.

Individual RVs on separately owned parcels not under common control or RVs that are designed or used as permanent dwelling units are required to meet the same requirements as a dwelling unit.

Relevant definitions and references from State and Federal codes and standards for RVs and RV Parks are appended to this guidance document.

**NC DEPARTMENT OF HEALTH AND HUMAN SERVICES • DIVISION OF PUBLIC HEALTH**

LOCATION: 5605 SIX FORKS RD, RALEIGH NC 27609

MAILING ADDRESS: 1642 MAIL SERVICE CENTER, RALEIGH NC 27699-1642

www.ncdhhs.gov • TEL: 919-707-5874 • FAX: 919-845-3972

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## II. Design and Review Requirements

RV Parks shall include an approved wastewater system and each space that is individually connected to a water supply source shall discharge to an approved wastewater system [G.S. 130A-335(a), 15A NCAC 18A .1937(a)].

### A. GENERAL

The LHD may request State review of any design proposal or may require an engineering design and State review pursuant to 15A NCAC 18A .1938(d-f), and .1964.

### B. LHD REVIEW AND APPROVAL

The LHD may review the application, evaluate the site, and approve the design for the proposed site and system in accordance with 15A NCAC 18A .1900 and this document when all of the following apply:

1. Design daily flow is less than or equal to 1,500 gallons per day based on:
  - a. Traditional RVs: 120 gallons per day (gpd)/space in an RV Park, with a maximum of four (4) occupants/RV [15A NCAC 18A .1949(b)] (12 spaces maximum);
  - b. Park Model RVs: 175 gpd/space in an RV Park, with a maximum of four (4) occupants/RV (8 spaces maximum); or
  - c. Any combination of Traditional and Park Model RV's that results in a design daily flow less than or equal to 1,500 gpd, based on flow rates listed in II.B.1;
2. Tank and effluent screen capacity assigned in accordance with guidance;
3. No collection sewer proposed;
4. Assigned LTAR is less than or equal to the mean of the soil group;
5. No proposed drainfield reductions for provisional, innovative, or accepted products or for systems addressed in 15A NCAC 18A .1955(p) and .1956(3)(a); and
6. No design daily flow adjustment is requested.

### C. EVALUATION AND DESIGN BY A LICENSED PROFESSIONAL

A PE shall be required and licensed soil scientist (LSS) or licensed geologist (LG) may be required [15A NCAC 18A .1938(d) and (i)] when any of the following conditions apply:

1. Unreduced design daily flow greater than 1,500 gpd, per Section II.B.1;
2. Collection sewer is proposed prior to septic tank(s) [15A NCAC 18A .1938(d)(5)];
3. Advanced pretreatment is proposed and the specific unit requires an engineered design in the RWTS or I&E Approval; or
4. A design daily flow adjustment of any kind is proposed.

State review shall be required when the unreduced design daily flow is greater than 3,000 gpd, when the design utilizes an advanced pretreatment system not approved under Rule 15A NCAC 18A .1957 or .1969; or for any system designed to handle RV waste disposed of in a dump station.

## III. Design Parameters and Considerations

### A. DESIGN DAILY FLOW

1. Traditional RVs: 120 gallons per day (gpd)/space in an RV Park, with a maximum of four (4) occupants/RV [15A NCAC 18A .1949(b)]
2. Park Model RVs: 175 gpd/space in an RV Park, with a maximum of four (4) occupants/RV

### B. DESIGN DAILY FLOW ADJUSTMENT

1. Design daily flow adjustments may be granted for RV Parks (Traditional and Park Model spaces) in accordance with 15A NCAC 18A .1949(c). Any design daily flow adjustment request shall be accompanied by documentation required in 15A NCAC 18A .1949(c) and shall account for the resulting increased constituent concentrations. This requires the services of a PE and/or a LSS or LG.

2. Typically, design daily flow adjustments are based upon multiple RV spaces being connected to a common wastewater system since flow data are generally not available for individual RV units served by individual wastewater systems. Sampled or projected wastewater characteristics are to be included with requests for design daily flow adjustments.
3. Tank and effluent screen capacity shall be based on the unreduced design daily flow.
4. The LTAR shall not exceed the mean of the soil group and no drainfield reduction for use of provisional, innovative, or accepted products or for systems address in 15A NCAC 18A .1955(p) and .1956(3)(a) shall be applied unless advanced pretreatment is used.

#### C. WASTEWATER STRENGTH

1. If wastewater strength is not characterized specifically, it shall be assumed to be high strength.
2. Wastewater characterization shall be based on at least two effluent samples collected during normal or above-normal operating periods from the existing RV Park (when expansion or repair of the system is proposed) or from a comparable facility. Samples shall be analyzed for at least BOD, TSS, TKN, and FOG. Wastewater is high strength when BOD, TSS, TKN, or FOG exceed 350, 100, 100, or 30 mg/L, respectively.
3. If the LHD reviews the proposal in-house without requiring wastewater characterization, wastewater shall be assumed to be high strength and all conditions of Section II.B shall be met.
4. For all systems required to be designed by a licensed professional in accordance with Section II.C where the wastewater is assumed or confirmed to be high strength, designers may:
  - a. Design the system to include advanced pretreatment to achieve domestic strength (unless subject to a higher treatment standard pursuant to 15A NCAC 18A .1970) at the point of dispersal; or
  - b. Provide calculations and analysis, as follows:
    - i. mass loading calculations based on site-specific projected or measured effluent characteristics and the design flow established in Section III.B. Calculations shall demonstrate that the soil loading rate does not exceed the mass loading rates in the Table in Appendix A of this Guidance; and
    - ii. site-specific nitrate-nitrogen migration analysis based on projected or measured effluent characteristics that demonstrates that the effluent dispersal results in < 10 mg/L nitrate-nitrogen at the compliance boundary (property line).
5. For systems subject to Section II.C., the requirements of Section III.C.4 shall not apply if wastewater strength is specifically characterized and determined to be of domestic strength (and not subject to a higher treatment standard pursuant to 15A NCAC 18A .1970).

#### D. TANK CAPACITY

1. Tank capacity shall be based on design daily flow computed prior to any design daily flow adjustment per 15A NCAC 18A .1952(b), except as specified in 2, below.
2. Minimum septic tank capacity shall be based on Table 1.

**Table 1:** Minimum septic tank capacity for RV Parks according to projected flow

Number of RVs or Unreduced Flow (Q)	Minimum Septic Tank Capacity (gallons)
1-2	1,000
3	1,500
4	1,800 or 3 x Q, whichever is greater
Q = 600 to 1,500 GPD	3 x Q
Q = > 1,500 to 3,000 GPD	2Q + 1,500
Q = > 3,000 to 4,500 GPD	Q + 4,500
Q = > 4,500 GPD	2Q

3. Each septic tank shall have an effluent filter rated for commercial use with a maximum screen opening of 1/32-inch filtration slots.

4. Pump tank capacity shall be equal to or greater than the required septic tank capacity.

#### **E. DISPERSAL FIELD**

1. Dispersal fields shall be sized based upon a long-term acceptance rate (LTAR) which does not exceed the mean rate for the applicable soil group and system per the 15A NCAC 18A .1900 rules.
2. No drainfield reductions for provisional, innovative, or accepted products or for systems addressed in 15A NCAC 18A .1955(p) and .1956(3)(a), unless the wastewater is determined to be domestic strength in accordance with 15A NCAC 18A .1969(m). (See III.B. Wastewater Strength)

#### **F. NO WATER OR SEWER CONNECTIONS WITH BATHHOUSE**

1. RV spaces for independent Traditional RVs that are not provided with water and sewer connections shall be treated as campsites if a bathhouse with an approved wastewater system is provided and if an independent, non-discharging dump station permitted by the Division of Waste Management is available. RVs are not allowed to discharge the holding tank waste into an on-site wastewater system unless it has been specifically designed and approved for RV holding tank waste.
2. Bathhouse wastewater systems are sized at 100 gpd/campsite with a maximum occupancy rating of four people/RV site.

#### **G. DUMP STATION**

1. A dump station is highly recommended for RV Parks so that travelers can empty their holding tanks upon entry to the park. Since the contents are expected to be highly concentrated, this practice will decrease loading to the on-site wastewater system.
2. Permits for dump stations are to be obtained from the Division of Waste Management [G.S. 130A-290(a)(1c) and (a)(32); 15A NCAC 13B .0832(b)].
3. If a dump station is proposed to discharge to a system governed under 15A NCAC 18A .1900, an engineered design shall be required and the design shall be submitted to the State for review and approval.

### **IV. Ownership, Operation, and Maintenance**

#### **A. OWNERSHIP**

1. RV Parks are typically owned and controlled by a single person or entity. Prior to the construction authorization, the requirements of 15A NCAC 18A .1938(j) shall be met.
2. When the individual spaces are to be separately owned, and a common on-site wastewater system serves two or more individual spaces an owner's association and bi-party agreement are typically required, in accordance with 15A NCAC 18A .1937(h).

#### **B. OPERATION AND MAINTENANCE**

1. An operator in responsible charge (ORC) shall be required in accordance with 15A NCAC 18A .1961 and individual product approvals.
2. Systems meeting the provisions of Section III.C.3 or 4 shall either:
  - a. Monitor effluent prior to dispersal and if maximum levels are exceeded for any stipulated parameters, conduct groundwater monitoring; or
  - b. Monitor groundwater prior to or at the compliance boundary (property line).
3. The following operation and maintenance practices shall be followed:
  - a. If a dump station is available at the site, prominently display signs at all entrances and within the park notifying RV owners that the contents of the RV holding tank are to be dumped at the dump station prior to connecting to the subsurface system.
  - b. Management should specify practices to minimize the need for odor-controlling chemicals to be added while RVs are connected to the system. This includes:
    - I. Proper flushing of solids to prevent build-up of paper/fecal material when dumping the black water tank.
    - II. Rinsing the tank with fresh water after each dump.

- c. If utilized, use odor control chemicals sparingly that are enzyme- or bacteria-based and do not contain:
  - I. formaldehyde,
  - II. para-formaldehyde,
  - III. quaternary ammonium,
  - IV. dichlorobenzene, or
  - V. pesticides

**Appendix A: LTAR Table for Mass Loading Calculations**

<b>LTAR (gpd/ft<sup>2</sup>)</b>	<b>Mass Loading Rate* (lbs per day/ft<sup>2</sup>)</b>
0.05	0.0001251
0.1	0.0002502
0.15	0.0003753
0.2	0.0005004
0.25	0.0006255
0.3	0.0007506
0.35	0.0008757
0.4	0.0010008
0.45	0.0011259
0.5	0.001251
0.6	0.0015012
0.7	0.0017514
0.8	0.0020016
0.9	0.0022518
1.0	0.002502
1.1	0.0027522
1.2	0.0030024

**\*Mass loading rate based upon combined load of BOD and TSS**

## **Appendix B: Recreational Vehicle Definitions and Code References**

### **Recreational Vehicles and Travel Trailers vs. a Dwelling Unit**

State and Federal housing and building codes provide the primary differentiation between a dwelling unit (including a manufactured home) and an RV. A manufactured home is designed to be used as a permanent or temporary dwelling unit, built on a permanent chassis, designed to be used with or without a permanent foundation, and requires connection to all required utilities. It is treated fully as a dwelling unit, subject to minimum housing standards and the State building code.

An RV is generally considered exempt from State and Federal building code requirements and minimum Federal Housing and Urban Development (HUD) code requirements. To meet this exclusion, RV's have the following common characteristics:

- Built on a single chassis,
- Camping units that provide up to 400 square feet of living space when erected on-site,
- Self-propelled or permanently towable by a light-duty truck, and
- Designed primarily as temporary living quarters for recreational, camping, travel, or seasonal use, but not as a permanent dwelling.

### **Traditional RVs vs. Recreational Park Trailers**

There are two major classes under the broad class of Recreational Vehicles.

#### **Traditional RVs:**

This includes travel trailers, motor homes (Class A, B, and C), 5th wheel trailers, and pop-up or folding-tent trailers. These Traditional RVs are required to be permanently labeled as Travel Trailers and are to comply with NFPA Standard 1192. These RVs typically measure 320 square feet or less, with a width of 8.5 feet or less, and do not require a special permit to be transported on State highways. However, there are exceptions to these size limitations that are still considered compliant with NFPA 1192.

From a wastewater standpoint, these RVs typically include two holding tanks (a black water tank and a graywater tank), and ultra-low-flow water use fixtures (e.g., a sealed mechanical toilet that uses 1 to 2 quarts per flush). They are designed to be self-contained or, alternately, to be connected to water and sewer utilities.

#### **Recreational Park Trailers:**

Recreational Park Trailers (Park Models) are required to comply with a different construction standard [American National Standards Institute (ANSI) 119.5], and are sized to provide no more than 400 square feet of living space when erected on-site. There are no exceptions to this size limit. The Park Models can either be reduced in size to an 8.5-foot width (expandable after transport), which can then usually be moved without a special movement permit or are more typically sized just under 12 feet wide, requiring a special permit and the services of a commercial mover.

Park Models typically do not contain holding tanks and are dependent on connection to on-site water and sewer utilities. Fixtures are standard in terms of water consumption. Most are permanently placed for use in RV Parks. Park Models may also include laundry machines, although most occupants are more likely to use common laundry facilities provided within the park.

### **Definitions and Code References**

**Recreational Vehicle:** "A vehicular-type unit that is primarily designed as temporary living quarters for recreational, camping, or seasonal use; has its own motive power or is mounted on or towed by another vehicle; is regulated by the

National Highway Traffic Safety Administration as a vehicle or vehicle equipment; does not require a special highway use permit for operation on the highways; and can be easily transported and set up daily by an individual.”

**Source:** *NFPA 1192 Standard on Recreational Vehicles, Section 3.3.46*  
(Note: NFPA 1192 replaced NFPA 501C)

Recreational Park Trailer: “A single living unit trailer type unit that is primarily designed and completed on a single chassis, mounted on wheels, to provide temporary living quarters for recreational, camping, or seasonal use, is certified by the manufacturer as complying with all applicable requirements of ANSI A119.5 and:

- (a) has a gross trailer area not exceeding 400 square feet (37.15 square meters) in the setup mode, or
- (b) if having a gross trailer area not exceeding 320 square feet (29.72 square meters) in the setup mode, has a width greater than 8.5 ft. (2.59 meters) in the transport mode.”

**Source:** *ANSI A119.5 Park Model Recreational Vehicle Standard, 2015 edition.*

Recreational Vehicle Park (refers to Definition of Campground). Campground: “Any parcel or tract of land under the control of any person, organization, or governmental entity wherein two or more recreational vehicle, recreational park trailer, and/or other camping unit sites are offered for use by the public or members of an organization for overnight stays.”

**Source:** *NFPA 1194 Standard for Recreational Vehicle Parks and Campgrounds, Section 3.3.2.*

Manufactured Homes: “The manufactured homes covered under this Code are 1) manufactured homes complying with the U.S. Department of Housing and Urban Development *Manufactured Home Construction and Safety Standards Program* as set forth in U.S. 24 C.F.R., Parts 3280, 3282 and 3283 and 2) manufactured homes built prior to June 15, 1976, including those complying with the *Standard for Mobile Homes NFPA 501B/ANSI A119.1* (edition in effect at the time of manufacture). Note: The HUD *Manufactured Home Construction and Safety Standards Program* is composed of three parts as authorized by 42. U.S.C.5401 *et. seq*:

- Part 3280 - Manufactured Home Construction and Safety Standards
- Part 3282 - Manufactured Home Procedural and Enforcement Regulations
- Part 3283 - Manufactured Home Consumer Manual Requirements”

INTENDED USAGE OF MANUFACTURED HOMES COVERED UNDER THIS CODE: “The Provisions of this Code are intended to apply to manufactured homes (single-section, multi-section, or expandable types) for use as single family dwellings:

Note 3: The provisions of this Code shall not apply to recreational vehicles as defined in the NFPA 501C, *Standard for Recreational Vehicles*, or to Park Trailers as defined in the ANSI A119.5, *Standards for Park Trailers*.”

**Source:** *North Carolina Regulations for Manufactured Homes, 2004 Edition*

Recreational Vehicles: “Recreational vehicles are not subject to this part, part 3280, or part 3283. A recreational vehicle is a vehicle which is:

- 1. Built on a single chassis;
- 2. 400 Square feet or less when measured at the largest horizontal projections;
- 3. Self-propelled or permanently towable by a light duty truck; and
- 4. Designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.”

**Source:** *Part 3282.8(g), 3282.8(g)(1), 3282.8(g)(2), 3282.8(g)(3), 3282.8(4), HUD Manufactured Home Procedural and Enforcement Regulations promulgated pursuant to the National Manufactured Housing Construction and Safety Standards Act of 1974.*



North Carolina Department of Insurance, Office of State Fire Marshal (NCDOT, OSFM) Position on setting up Recreational Park Trailers (Park Models) as Permanent Dwellings:

Excerpts:

**Recreational Park Trailer – Temporary Installation:** “Since these units are defined to be temporary structures, it is not permissible to set them up as permanent dwelling units. Therefore, it is our interpretation that they cannot have any permanent plumbing or mechanical connections. “...to remain classified as a temporary structure, the wheels and axles must remain on the unit at all times.”

**Recreational Park Trailer – Permanent Installation:** Recreational Park Trailers “cannot be accepted as a permanent dwelling structure in North Carolina” unless the units are dual labeled and “also constructed and labeled under either the NC Modular Construction Program as a single family modular dwelling or under the *Federal Manufactured Housing Construction and Safety Standards* as a single family (HUD) manufactured home.”

**Source:** *North Carolina Department of Insurance, Office of State Fire Marshall memo on Recreational Park Trailers (Park Models)/Permanent Dwellings*

NC Solid Waste Laws and Rules:

“Chemical or portable toilet” means a self-contained mobile toilet facility and holding tank and includes toilet facilities in recreational vehicles.

**Source:** *NCGS 130A-290(a)(1c)*

"Septage" means solid waste that is a fluid mixture of untreated and partially treated sewage solids, liquids, and sludge of human or domestic origin which is removed from a wastewater system. The term septage includes the following:

- a. Domestic septage, which is either liquid or solid material removed from a septic tank, cesspool, portable toilet, Type III marine sanitation device, or similar treatment works receiving only domestic sewage. Domestic septage does not include liquid or solid material removed from a septic tank, cesspool, or similar treatment works receiving either commercial wastewater or industrial wastewater and does not include grease removed from a grease trap at a restaurant.

**Source:** *NCGS 130A-290(a)(32)*

Recreational vehicle waste provisions.

“(1) Domestic septage from a recreational vehicle shall be managed in accordance with this Section or shall flow directly into a wastewater treatment system permitted by the Department of Environment and Natural Resources.

(2) Wastewater from recreational vehicles that are tied down, blocked up, or that are not relocated on a regular basis, and that are not connected to an approved wastewater system shall be managed in accordance with Article 11, Chapter 130A of the NC General Statutes.

(3) Recreational vehicle dump stations that do not discharge directly to a wastewater treatment system permitted by the Department of Environment and Natural Resources shall be permitted as a septage detention and treatment facility in accordance with this Section.”

**Source:** *15A NCAC 13B .0832(b)*